

Virginia

Standards of Learning Assessments

Test Blueprint

Grade 4 Mathematics

**2016 Mathematics
Standards of Learning**

**This revised test blueprint will be effective with the
administration of the 2018-2019 Mathematics Standards of
Learning (SOL) tests.**

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Grade 4 Mathematics Standards of Learning

Test Blueprint

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General Test Information

Test Blueprint

Much like the blueprint for a building, a test blueprint serves as a guide for test construction. The blueprint indicates the content areas that will be addressed by the test and the number of items that will be included by content area and for the test as a whole. There is a blueprint for each test (e.g., grade 3 reading, grade 5 mathematics, grade 8 science, Virginia and United States History).

The Grade 4 Mathematics blueprint contains information for two types of tests, the online computer adaptive test (CAT) and the traditional test. A CAT is an online assessment that is customized for every student based on how the student responds to the questions. This is in contrast to the traditional test in which all students who take a particular version (paper, large print, or braille) of the test respond to the same test questions. All online versions of the Grade 4 Mathematics Standards of Learning (SOL) test (including audio) are computer adaptive.

All students are required to take the online version of the SOL tests with the exception of students who meet the criteria for needing a paper test. All paper versions of the test (including large print and braille) will be administered using the traditional format. Beginning in spring 2019, there will no longer be a separate Plain English Mathematics assessment for English learners or students with disabilities who have documented significant language impairments. All test questions for Grade 4 Mathematics have been determined to meet the criteria for Universal Design. The Universal Design principles require that language that is not specific to the content area (e.g., mathematics) be simplified and test questions be written so they are accessible by all populations of students. The SOL test questions have been reviewed by Virginia teachers and have been determined to meet the criteria for Universal Design.

Reporting Categories

Each test covers a number of Standards of Learning. In the test blueprint, the SOL are grouped into categories that address related content and skills. These categories are labeled as reporting categories. For example, a reporting category for the Grade 4 Mathematics Standards of Learning test is *Computation and Estimation*. Each of the SOL in this reporting category addresses computation using addition, subtraction, multiplication, or division or requires the student to estimate the answer to a problem. When the results of the SOL tests are reported, the scores will be presented for each reporting category and as a total test score.

Assignment of Standards of Learning to Reporting Category

In the Grade 4 Mathematics SOL test, each SOL is assigned to only one reporting category. For example, SOL 4.1a-c is assigned to “Number and Number Sense.”

Coverage of Standards of Learning

Due to the large number of SOL in each grade level content area, every Standard of Learning will not be assessed on every SOL test. By necessity, to keep the length of a test reasonable, each test will sample from the SOL within a reporting category. All SOL are eligible for inclusion on the traditional forms as well as the CAT forms.

Use of the Curriculum Framework

The Grade 4 Mathematics Standards of Learning, amplified by the Curriculum Framework, define the essential understandings, knowledge, and skills that are measured by the Standards of Learning tests. The Curriculum Framework asks essential questions, identifies essential understandings, defines essential content knowledge, and describes essential skills students need to master.

Use of Calculators

The first section of the test will be taken without the use of a calculator. The SOL 4.2a-b, 4.3d, 4.4 a-c, 4.5b, and 4.6a will be assessed in the first section of the Grade 4 Mathematics test. All other SOL will be assessed in the second section with the use of a calculator.

**Grade 4 Mathematics
Test Blueprint Summary Table**

Reporting Category	Grade 4 SOL	Number of Items Computer Adaptive Test (CAT) Format	Number of Items Traditional Format
Number and Number Sense	4.1a-c 4.2a*, b*, c 4.3a-c, d*	9	12
Computation and Estimation	4.4a*, b*, c*, d 4.5a, b*, c 4.6a*, b	10	14
Measurement and Geometry	4.7 4.8a-d 4.9 4.10a-b 4.11 4.12	8	12
Probability, Statistics, Patterns, Functions, and Algebra	4.13a-c 4.14a-c 4.15 4.16	8	12
Number of Operational Items		35	50
Number of Field-Test Items**		5	none
Total Number of Items on Test		40	50

*Items measuring these SOL will be completed without the use of a calculator.

**Field-test items are being tried out with students for potential use on subsequent tests and will not be used to compute students' scores on the test.

Grade 4 Mathematics Expanded Test Blueprint

Reporting Category: Number and Number Sense

Number of Items: 9 (CAT) 12 (Traditional)

Standards of Learning:

- 4.1 The student will
- a) read, write, and identify the place and value of each digit in a nine-digit whole number;
 - b) compare and order whole numbers expressed through millions; and
 - c) round whole numbers expressed through millions to the nearest thousand, ten thousand, and hundred thousand.
- 4.2 The student will
- a) compare and order fractions and mixed numbers, with and without models;
 - b) represent equivalent fractions; and
 - c) identify the division statement that represents a fraction, with models and in context.
- 4.3 The student will
- a) read, write, represent, and identify decimals expressed through thousandths;
 - b) round decimals to the nearest whole number;
 - c) compare and order decimals; and
 - d) given a model, write the decimal and fraction equivalents.

Reporting Category: Computation and Estimation

Number of Items: 10 (CAT) 14 (Traditional)

Standards of Learning:

- 4.4 The student will
- a) demonstrate fluency with multiplication facts through 12×12 , and the corresponding division facts;
 - b) estimate and determine sums, differences, and products of whole numbers;
 - c) estimate and determine quotients of whole numbers, with and without remainders; and
 - d) create and solve single-step and multistep practical problems involving addition, subtraction, and multiplication, and single-step practical problems involving division with whole numbers.
- 4.5 The student will
- a) determine common multiples and factors, including least common multiple and greatest common factor;
 - b) add and subtract fractions and mixed numbers having like and unlike denominators; and

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- c) solve single-step practical problems involving addition and subtraction with fractions and mixed numbers.
- 4.6 The student will
- a) add and subtract decimals; and
 - b) solve single-step and multistep practical problems involving addition and subtraction with decimals.

Reporting Category: Measurement and Geometry

Number of Items: 8 (CAT) 12 (Traditional)

Standards of Learning:

- 4.7 The student will solve practical problems that involve determining perimeter and area in U.S. Customary and metric units.
- 4.8 The student will
- a) estimate and measure length and describe the result in U.S. Customary and metric units;
 - b) estimate and measure weight/mass and describe the result in U.S. Customary and metric units;
 - c) given the equivalent measure of one unit, identify equivalent measures of length, weight/mass, and liquid volume between units within the U.S. Customary system; and
 - d) solve practical problems that involve length, weight/mass, and liquid volume in U.S. Customary units.
- 4.9 The student will solve practical problems related to elapsed time in hours and minutes within a 12-hour period.
- 4.10 The student will
- a) identify and describe points, lines, line segments, rays, and angles, including endpoints and vertices; and
 - b) identify and describe intersecting, parallel, and perpendicular lines.
- 4.11 The student will identify, describe, compare, and contrast plane and solid figures according to their characteristics (number of angles, vertices, edges, and the number and shape of faces) using concrete models and pictorial representations.
- 4.12 The student will classify quadrilaterals as parallelograms, rectangles, squares, rhombi, and/or trapezoids.

Reporting Category: Probability, Statistics, Patterns, Functions, and Algebra
Number of Items: 8 (CAT) 12 (Traditional)
Standards of Learning:

- 4.13 The student will
- a) determine the likelihood of an outcome of a simple event;
 - b) represent probability as a number between 0 and 1, inclusive; and
 - c) create a model or practical problem to represent a given probability.
- 4.14 The student will
- a) collect, organize, and represent data in bar graphs and line graphs;
 - b) interpret data represented in bar graphs and line graphs; and
 - c) compare two different representations of the same data (e.g., a set of data displayed on a chart and a bar graph, a chart and a line graph, or a pictograph and a bar graph).
- 4.15 The student will identify, describe, create, and extend patterns found in objects, pictures, numbers, and tables.
- 4.16 The student will recognize and demonstrate the meaning of equality in an equation.